15. **Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.**

Show that the *eastward deviation* of bodies falling from a great height is

$$E_d=\frac{4\pi t(H-\frac{1}{2}\triangle)\cos\phi}{3T}.$$

Solutions to these problems should be received on or before August 1st.

DIOPHANTINE ANALYSIS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

5. **Proposed by ISAAC L. BEVERAGE, Monterey, Virginia.**

Find three numbers the sum of the squares of any two of which diminished by their product shall be a square number.

Solution by ARTEMAS MARTIN, LL. D., U. S. Coast and Geodetic Survey Office, Washington, D. C.

Let rx, ry, rz represent the numbers. Then we must satisfy

$$x^2-xy+y^2=\square \ldots.(1),$$
$$y^2-yz+z^2=\square \ldots.(2),$$
$$x^2-xz+z^2=\square \ldots.(3),$$

rejecting the square factor r^2.

Assume $x=2pq-q^2$, $y=p^2-q^2$, and (1) is satisfied. If we take $p=3$, $q=1$, we have $x=5$, $y=8$, and by substitution (2) and (3) become

$$z^2-5z+25=\square \ldots.(4),$$
$$z^2-8z+64=\square \ldots.(5).$$

Now put $(5)=(z-2n)^2$ and we get $z=\dfrac{16-n^2}{2-n}$.

Substituting this value of z in (4) and reducing, $n^4-5n^3+3n^2-20n+196=\square=(n^2-\frac{5}{2}n+14)^2$ say, whence $n=\frac{8}{5}$; therefore $z=\frac{168}{5}$, and, taking $r=5$, $rx=25$, $ry=40$, $rz=168$, three numbers satisfying the conditions of the problem,

Also solved by *H. W. DRAUGHON*, and *G. B. M. ZERR*.

6. **Proposed by Professor G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.**

Find three whole numbers the sum of any two of which is a cube.

Solution by H. W. DRAUGHON, Clinton, Louisiana.

Let the three numbers be, $\frac{1}{2}(x^3+y^3-z^3)$, $\frac{1}{2}(x^3-y^3+z^3)$, and $\frac{1}{2}(y^3-x^3+z^3)$, then,

$$\tfrac{1}{2}(x^3+y^3-z^3)+\tfrac{1}{2}(z^3-y^3+z^3)=x^3,$$
$$\tfrac{1}{2}(x^3+y^3-z^3)+\tfrac{1}{2}(y^3-x^3+z^3)=y^3, \text{ and}$$
$$\tfrac{1}{2}(y^3-x^3+z^3)+\tfrac{1}{2}(x^3-y^3+z^3)=z^3.$$

In order that the numbers may be positive and integral we must make

$z^3 < x^3 + y^3$ and $z^3 > z^3 - z^3$, and x, y, and z must be even numbers or two odd and the other even.

Ex. Put $x=9$, $y=7$, and $z=8$, the resulting numbers are, 280, 449, and 63.

Also solved by *P. S. BERG, M. A GRUBER, ARTEMAS MARTIN, H. C. WHITAKER*, and *G. B. M. ZERR.*

8. **Proposed by Hon. JOSIAH H. DRUMMOND, Portland, Maine.**

Every odd square is of the form $4a+1$; find the value of a for the nth consective odd square.

Solution by M. A. GRUBER, A. M., War Department, Washington, D. C., and R H. YOUNG, West Sunbury, Pennsylvania.

The consecutive odd squares are the squares of the consecutive odd numbers.

The difference between two consecutive odd numbers is 2.

Beginning with the odd number 1, the next odd number is 1×2 greater than 1; the 3d odd number is 2×2 greater than 1; the 4th odd number is 3×2 greater than 1, and so on to the nth odd number which is accordingly $n-1$ times 2 greater than 1.

The nth odd number is, therefore, $1+2n-2$, or $2n-1$.

$\therefore$ $(2n-1)^2=4a+1$, and $a=n^2-n=n(n-1)$.

Also solved by *A. H. BELL, C. W. M. BLACK, H. W. DRAUGHON, ARTEMAS MARTIN, P. H. PHILBRICK, H. C. WHITAKER, G. B. M. ZERR*, and the *PROPOSER*

AVERAGE AND PROBABILITY.

Conducted by B.F.FINKEL, Kidder, Missouri. All Contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

Proposed by Miss LEOTA MILLER, B. L., Professor of Natural Science and Art, Kidder Institute, Kidder, Missouri.

A deer, wounded at the corner of a square park, is equally liable to run in a straight line in any direction, from the corner of the park, and, at the same time, is also equally liable to drop dead before running a distance equal to the diagonal of the park. What is the chance that the deer will drop dead in the park?

II. Solution by W. B MILWARD, Amity, Missouri, and P. H. PHILBRICK, C. E., Lake Charles, Louisiana.

Let $ABCD$ represent the park diameter a, and describe a circle with center A and radius$=a\sqrt{2}=AC$ the diagonal of the park. Area of park$=a^2$; area of circle$=\pi(a\sqrt{2})^2=2\pi a^2$. The area of the circle represents one half of all possible ground upon which the deer will fall. Hence the required probability is $\dfrac{a^2}{4\pi a^2}=\dfrac{1}{4\pi}$.

[REMARK:—Professor Philbrick writes, June 21: It [the problem above] is